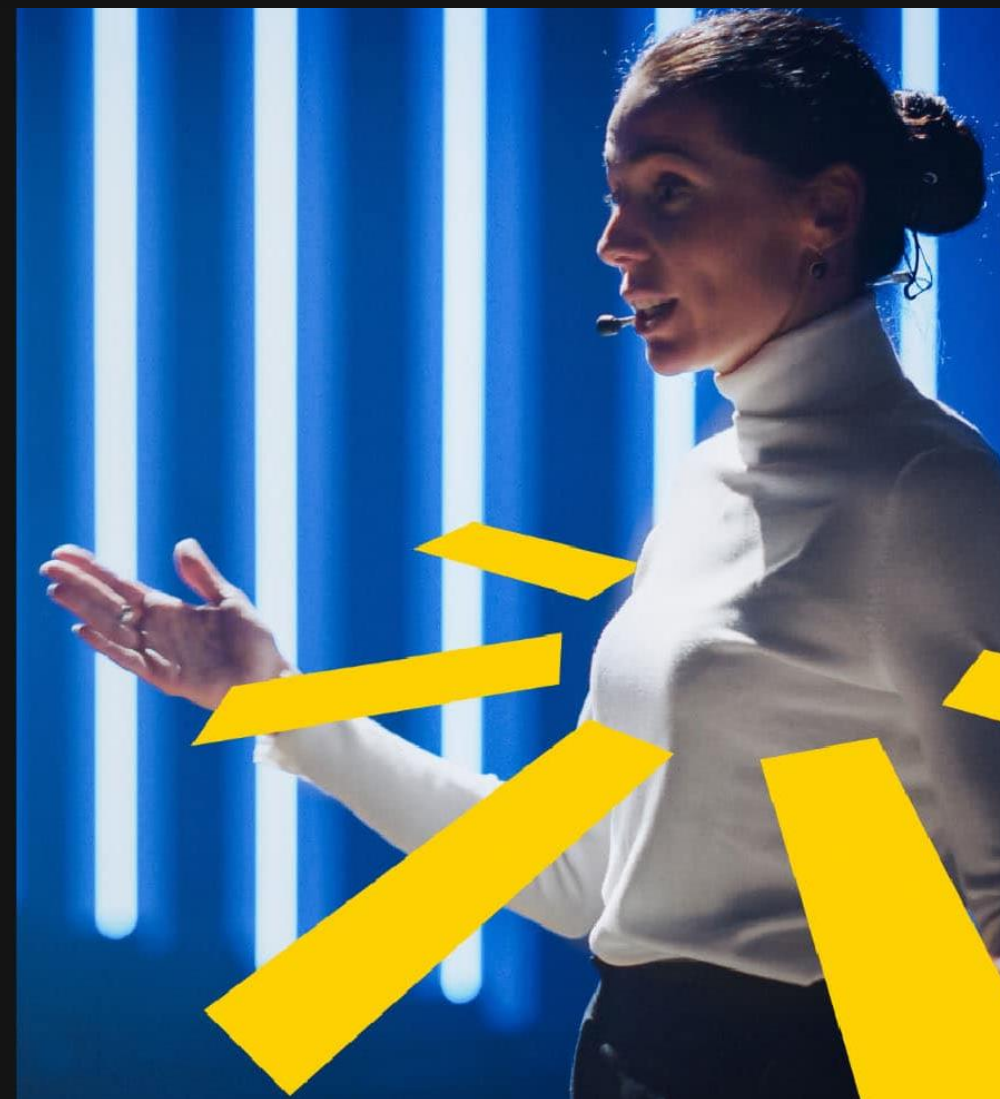


Welcome
too...

IGEL LIVE

18 September 2025

© IGEL 2025





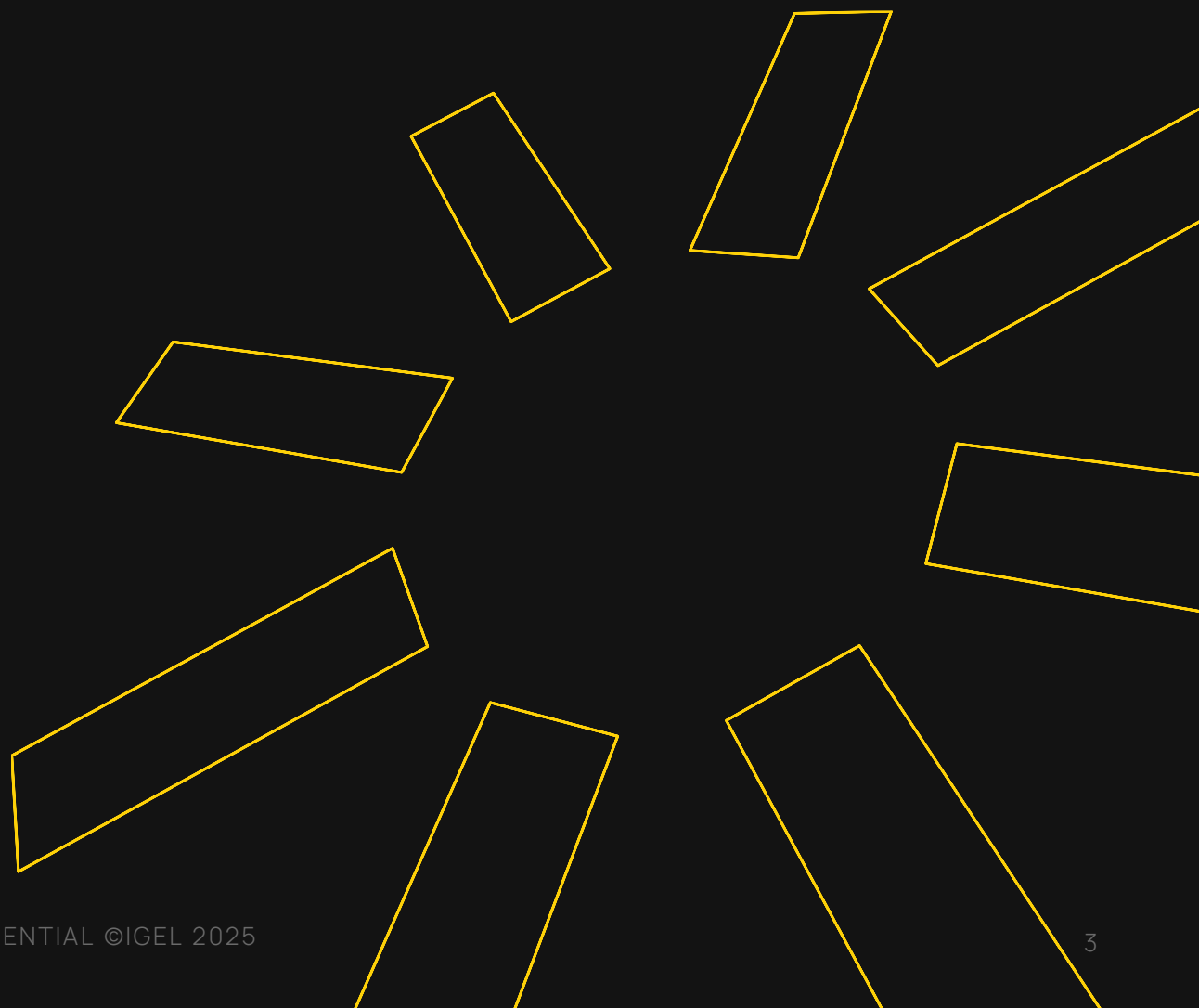
Business Continuity & Dual Boot

September 2025



Today's Agenda

- Background + Overview
- Tech Details + Architecture
- Deployment
- Considerations
- Troubleshooting
- Resources





Background + Overview



Businesses are under attack 24/7

2,200+ daily worldwide cyberattacks

317 million ransomware attacks, with about **59% of businesses** affected in 2024

560K+ new samples of malware daily

Global cost of cybercrime is projected to **reach \$10.5 trillion annually by 2025**

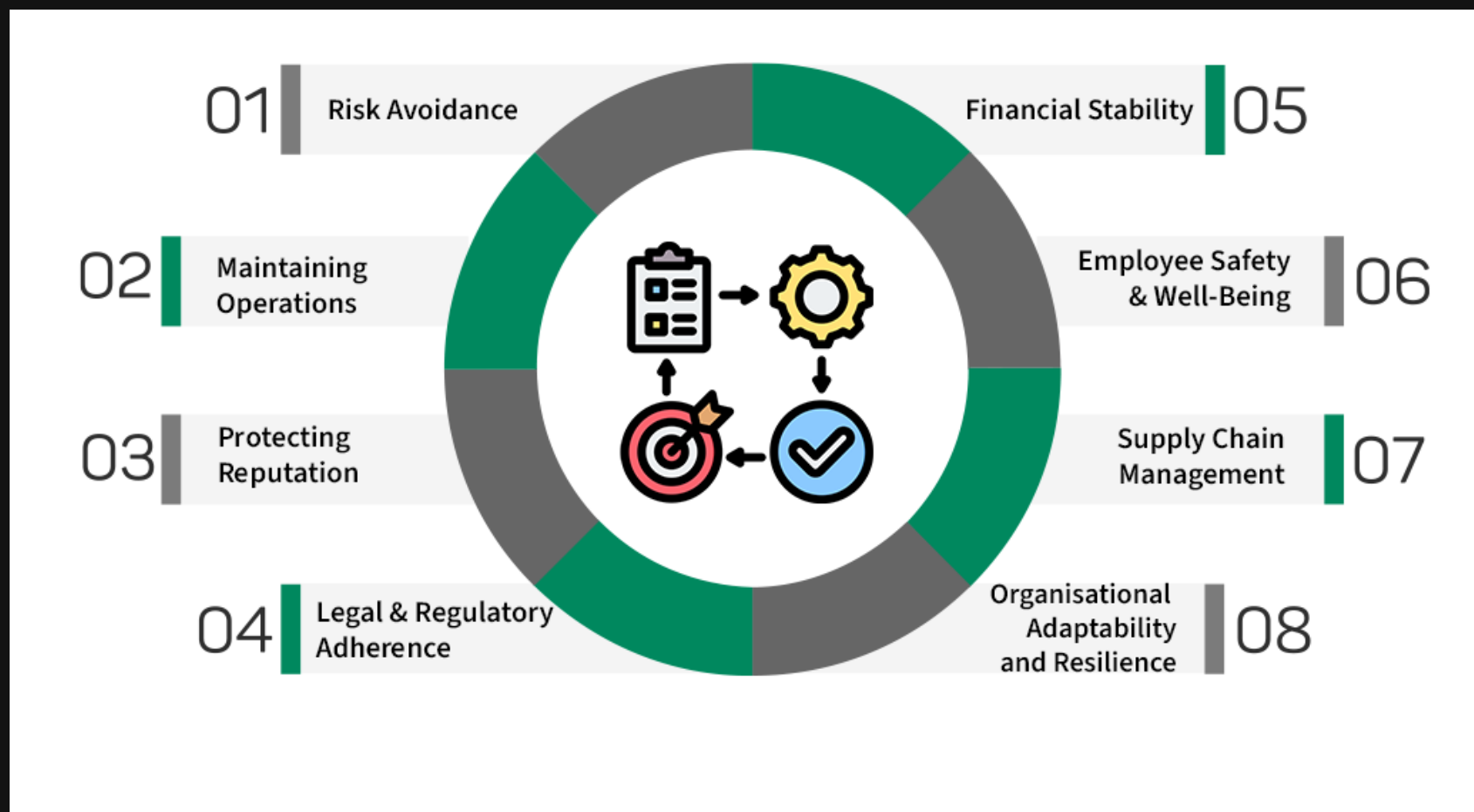
81% of businesses faced an attack involving malware

Average breach costs **\$9.4 million** per incident for a large US organization

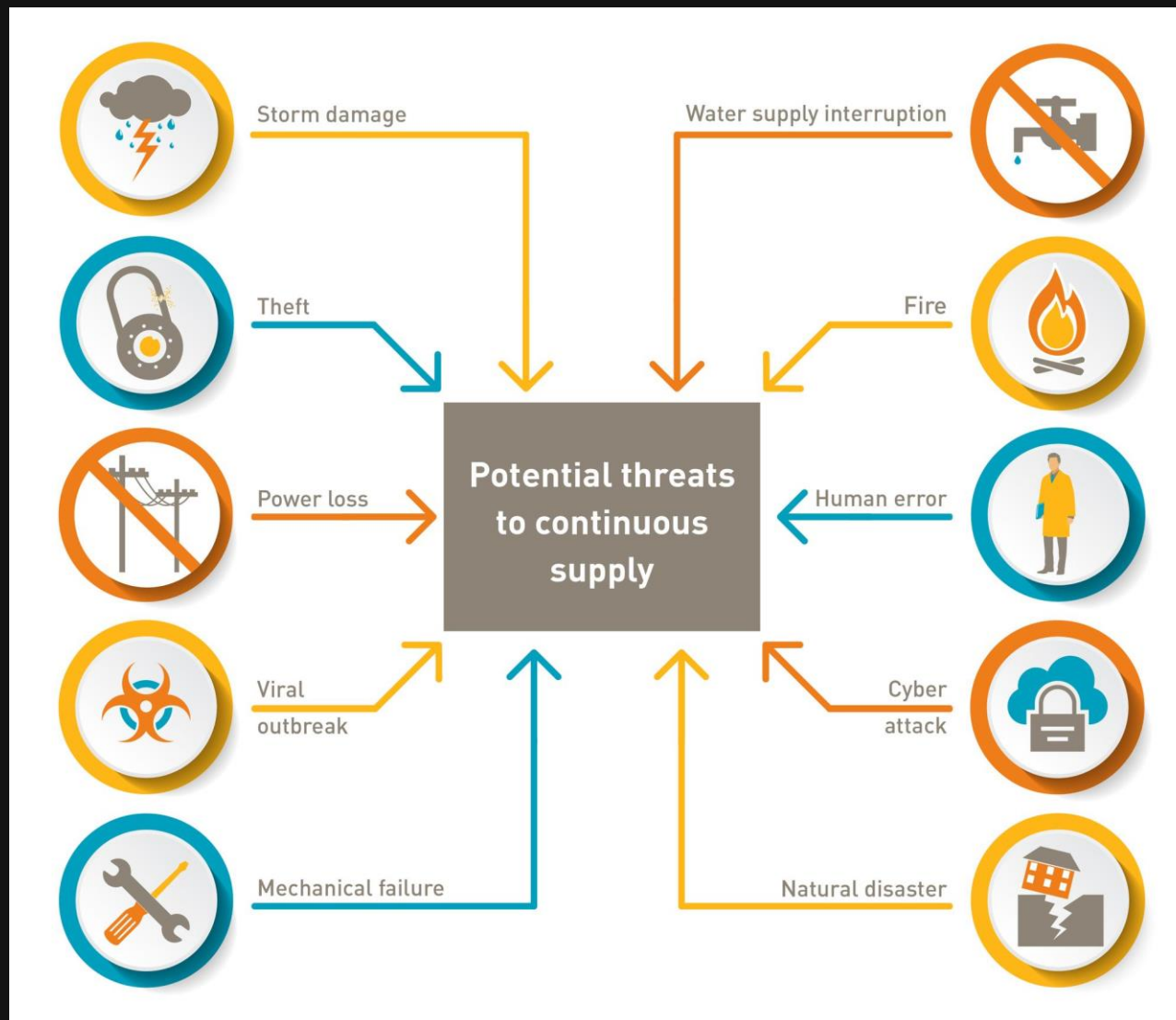
~83% of all malware infections are on Windows devices

Approximately **93% of ransomware targets Windows systems**

Importance of a DR/BC Plan



Business Continuity Applies to All Verticals



←We're focusing here

IGEL Business Continuity Options

The 4 Pillars



IGEL Secure OS
Locally installed



Windows & IGEL Secure OS
Dual-Boot mode



IGEL Secure OS
USB Boot
Fully portable
On-demand



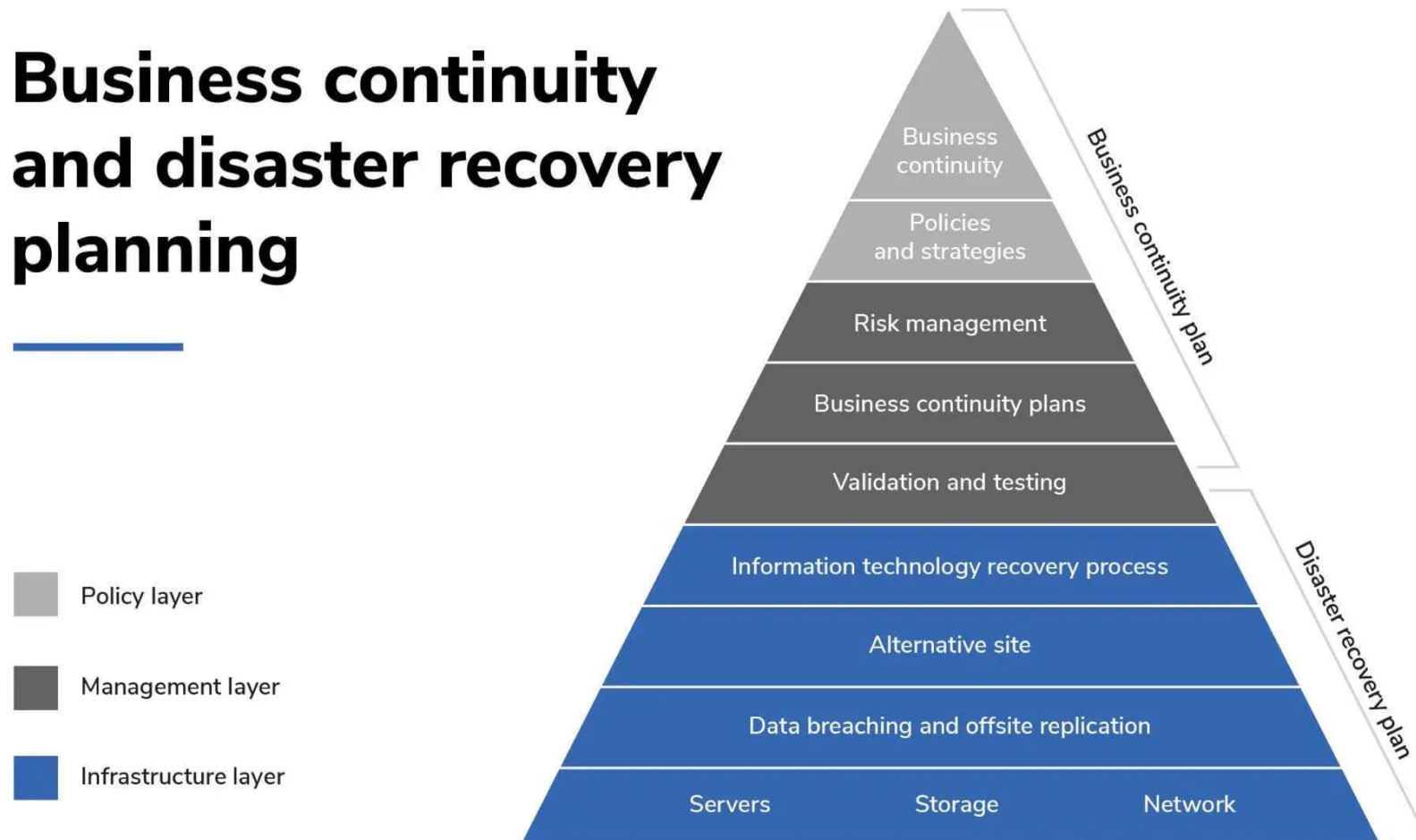
IGEL OS + Managed Hypervisor
Centrally managed
Locally deployed & virtualized
Immutable Windows instance

We're a Part of the Overall BC Picture



BC Frameworks Often Don't Consider Endpoints

Business continuity and disaster recovery planning



How do you ensure your endpoints are as resilient as your infrastructure?

Simply IGEL it!

IGEL Business Continuity & Disaster Recovery

- Offering SKU in price book
- IGEL Dual Boot™ Included
- 45-Day “Emergency Use” License
- 2,000 seat MOQ
- Enterprise Plus TRM
- Health Check Standard (Quick Start)
- USB-C/USB-A Combo Sticks Must Be Requested
 - 6-8 week average delivery time



Generated with Google Gemini

IGEL Dual Boot™ vs IGEL USB Boot™

Dual Boot

Included with BC SKU

Supports Windows 10 and 11 only

No USB port or access to hardware required

Must be local admin to install

IGEL OS is onboarded and tested in advance

Doesn't require changing BIOS/UEFI boot order

Won't work if hard drive is failed/missing

USB Boot

Available for customers if requested

Can have any OS or no OS

Requires available USB port to use

No admin permission required – only UEFI USB boot

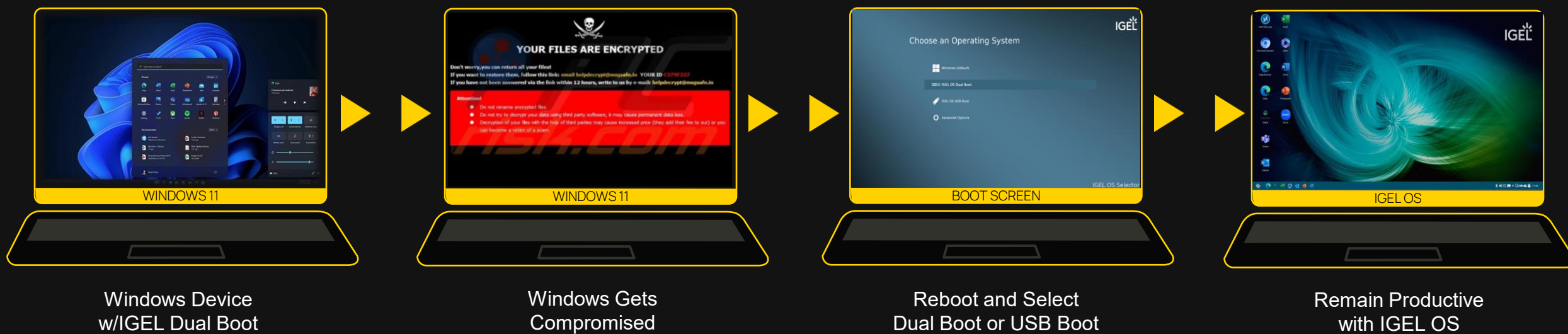
Generic IGEL OS image requires onboarding when incident occurs

Requires changing BIOS/UEFI boot order

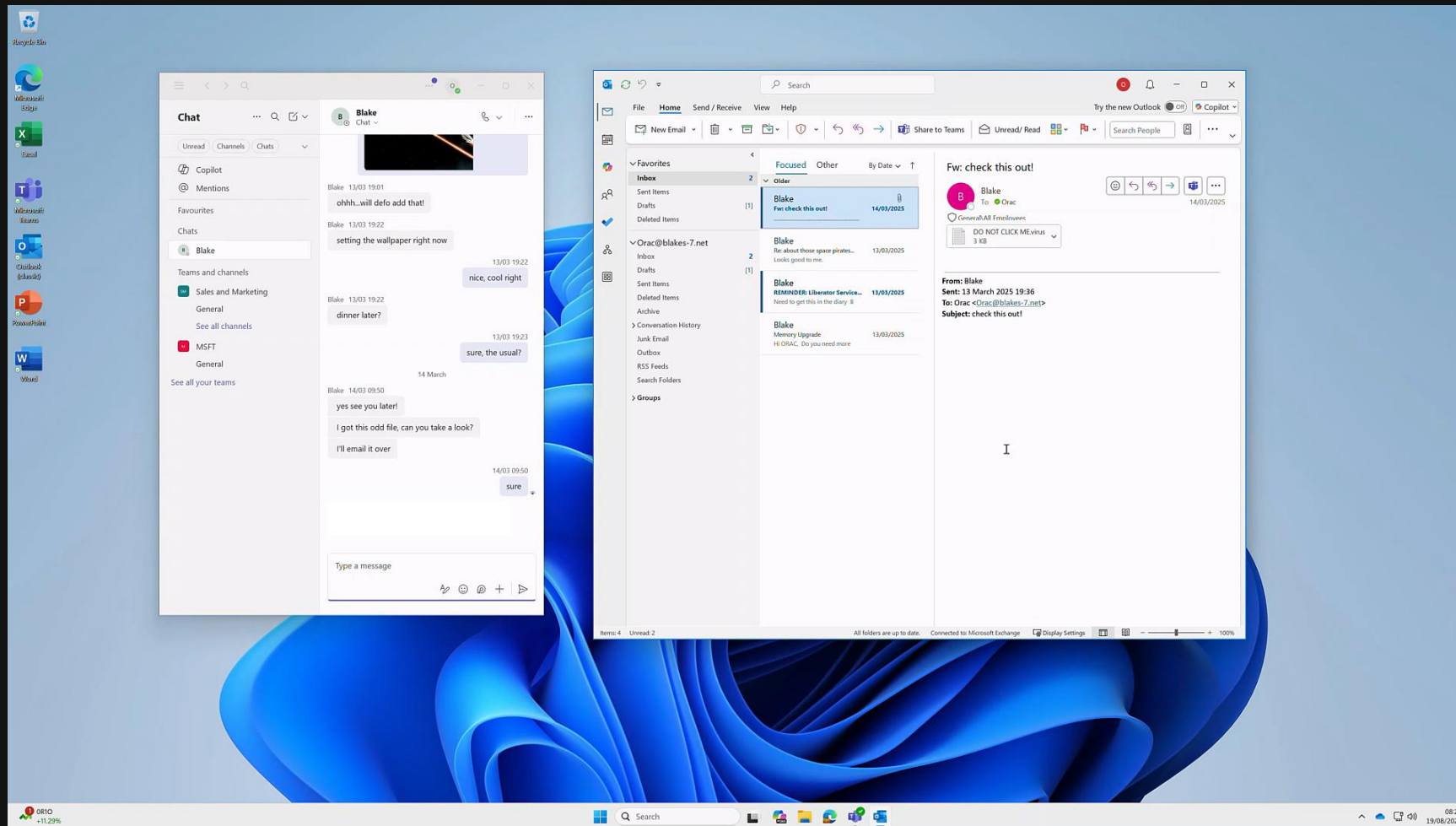
Works if hard drive is failed/missing

45-Day
“Emergency Use”

High-level “Marketecture”



IGEL Business Continuity & Disaster Recovery



Dual Boot™ vs IGEL Managed Hypervisor (IMH)

Dual Boot

Each OS runs directly on the hardware one at a time

Supports Windows 10 and 11 only

Separate Dual Boot SKU, 2K MOQ, TRM required

For emergency situations up to 45 days only

IMH

IGEL OS runs directly on the hardware and one or more guest VMs run on top

Any version of Windows can run (but XP and later officially tested)

IMH add-on license plus UMS Enterprise required

For regular, daily production use

Run Windows and IGEL OS on the same physical device

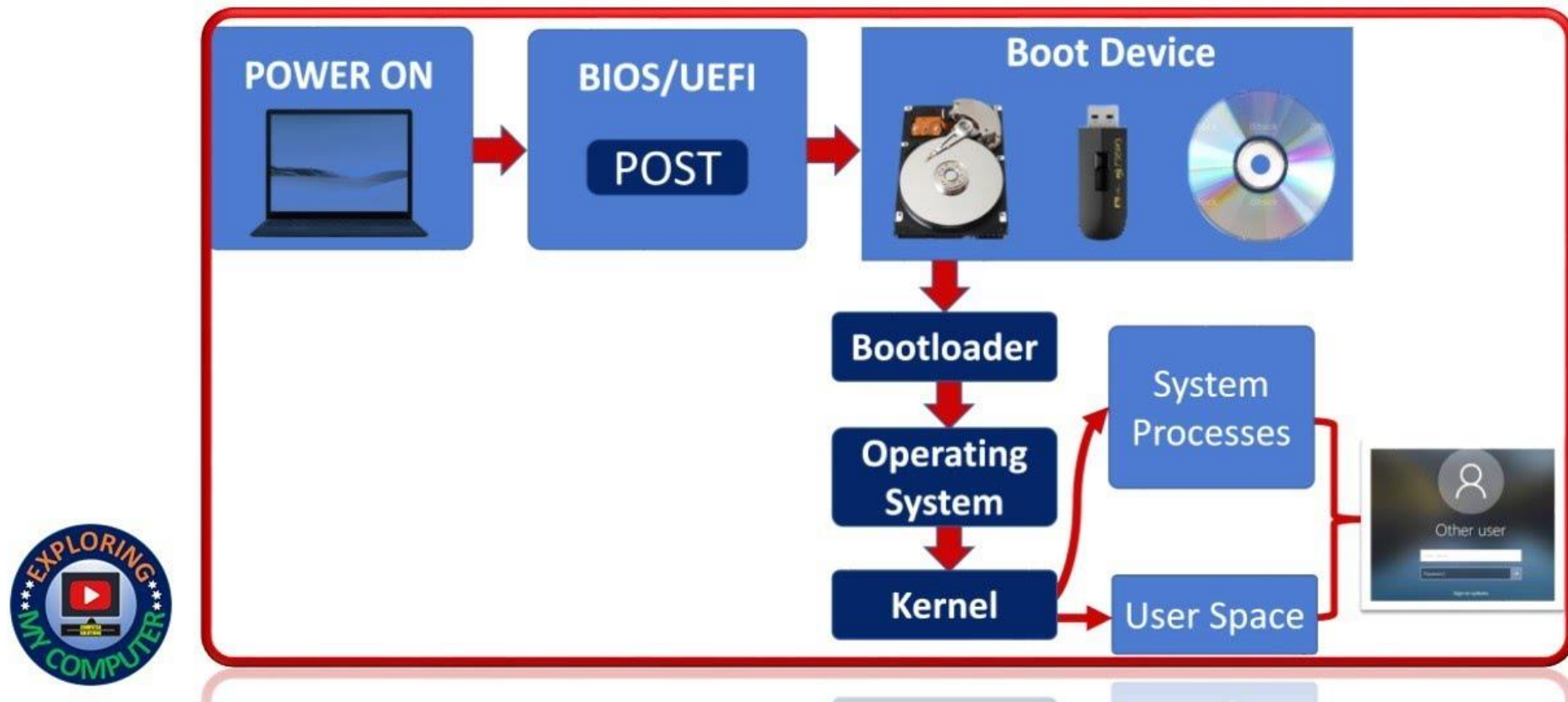
Separate license/entitlement required



Tech Details + Architecture



Boot Process in Your System



Concept of a Bootloader



Common Bootloaders



GRUB



LILO



macOS



Syslinux

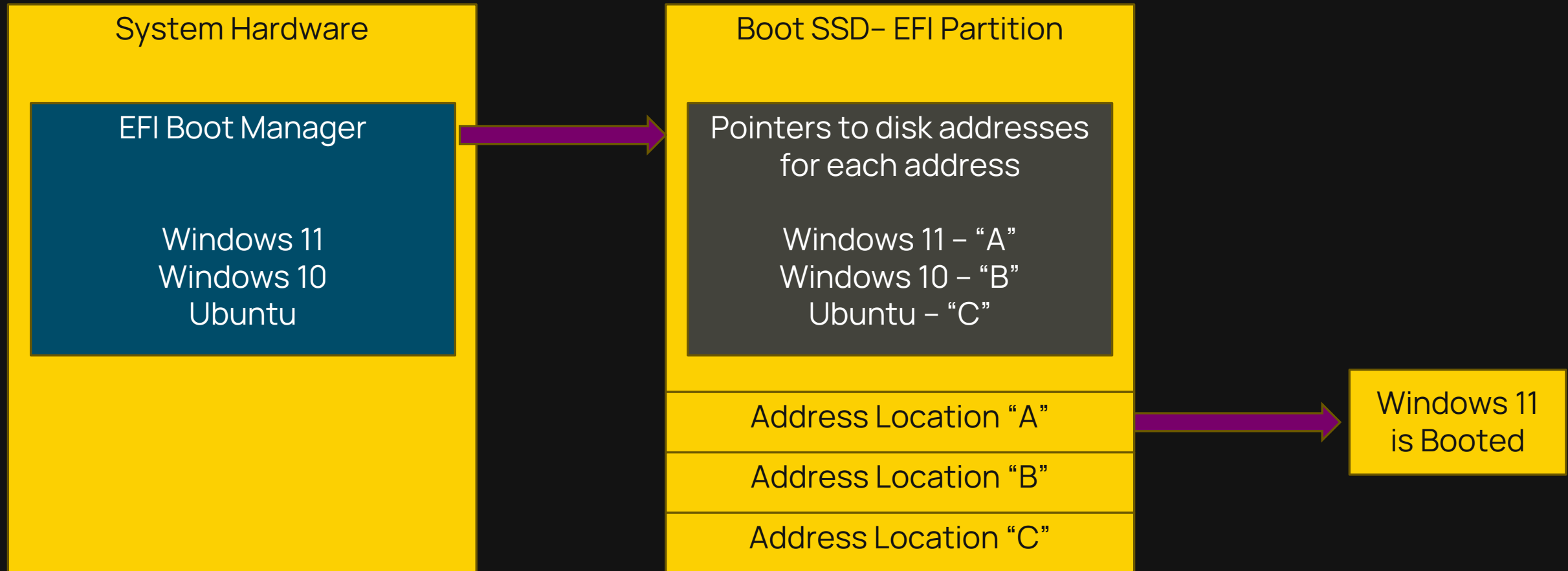


rEFInd

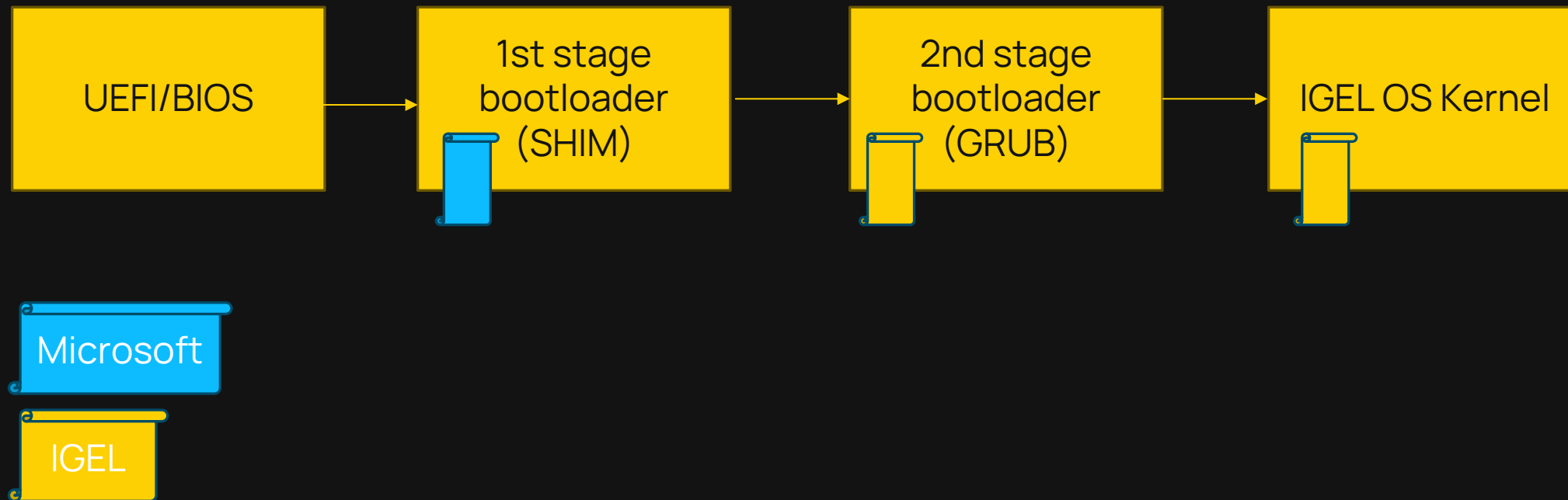


Windows

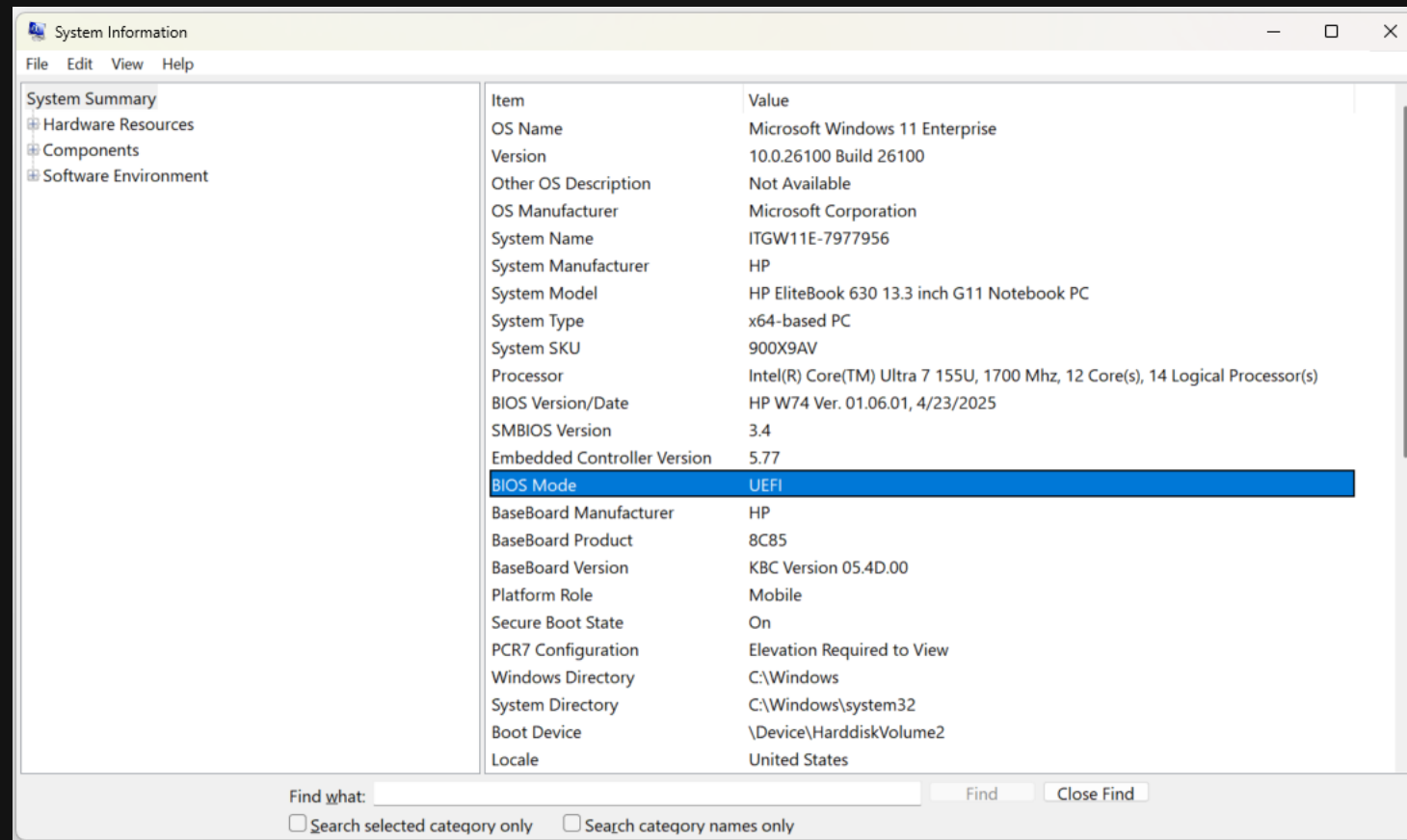
UEFI and EFI Partition



IGEL SecureBoot Chain



Checking in Windows for BIOS or UEFI



msinfo32

MVP Details of What We're Delivering

- Host OS can be Windows 11 or Windows 10
- MSI and EXE install packages (admin choice)
- Ability to dual-boot on primary, single drive only (multi-drive boot on roadmap)
- IGEL boot menu always shown to users
- Systray tool for selecting which OS to start
- Support for BitLocker encryption
- Mass deployment/scripted installs/SCCM will be tested

System Requirements for Dual Boot™

Windows 11



1Ghz+ / 2+ cores / HCL



4GB+ RAM



64GB+ Storage



TPM 2.0 / UEFI / Secure Boot

Resultant

1.5Ghz+ / 2+ cores / 64-bit / Win11 HCL

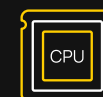
4GB Min / 8GB+ Recommended

120GB+ disk / 36GB+ free space
SSD Recommended

TPM 2.0 / UEFI / Secure Boot

IGEL OS

1.5Ghz+ / 2+ cores / 64-bit



4GB+ RAM



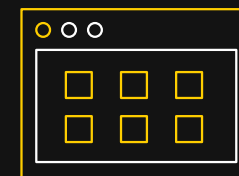
16GB dual-boot



Additional Requirements



12.7.2+



UMS 12.8.100+
or UMSaaS



Local Windows
Admin Credentials



Windows System
Restore Disabled

What can and can't IGEL Dual Boot™ do?

CAN

- Install IGEL OS from within Windows
- Dual-boot on primary physical drive
- Deploy IGEL OS with ESD tools or scripts - SCCM
- Be managed from UMS when online
- Allow users to select OS through boot menu

CAN'T

- Boot to IGEL if hardware has failed
- Install on non-boot drive (roadmap)
- Updates to IGEL OS within Windows (roadmap)
- Customize the boot screen (roadmap)
- Prevent users from booting IGEL OS as they wish



Deployment



High-level Setup Flow for IGEL Dual Boot™



Install



Reboot

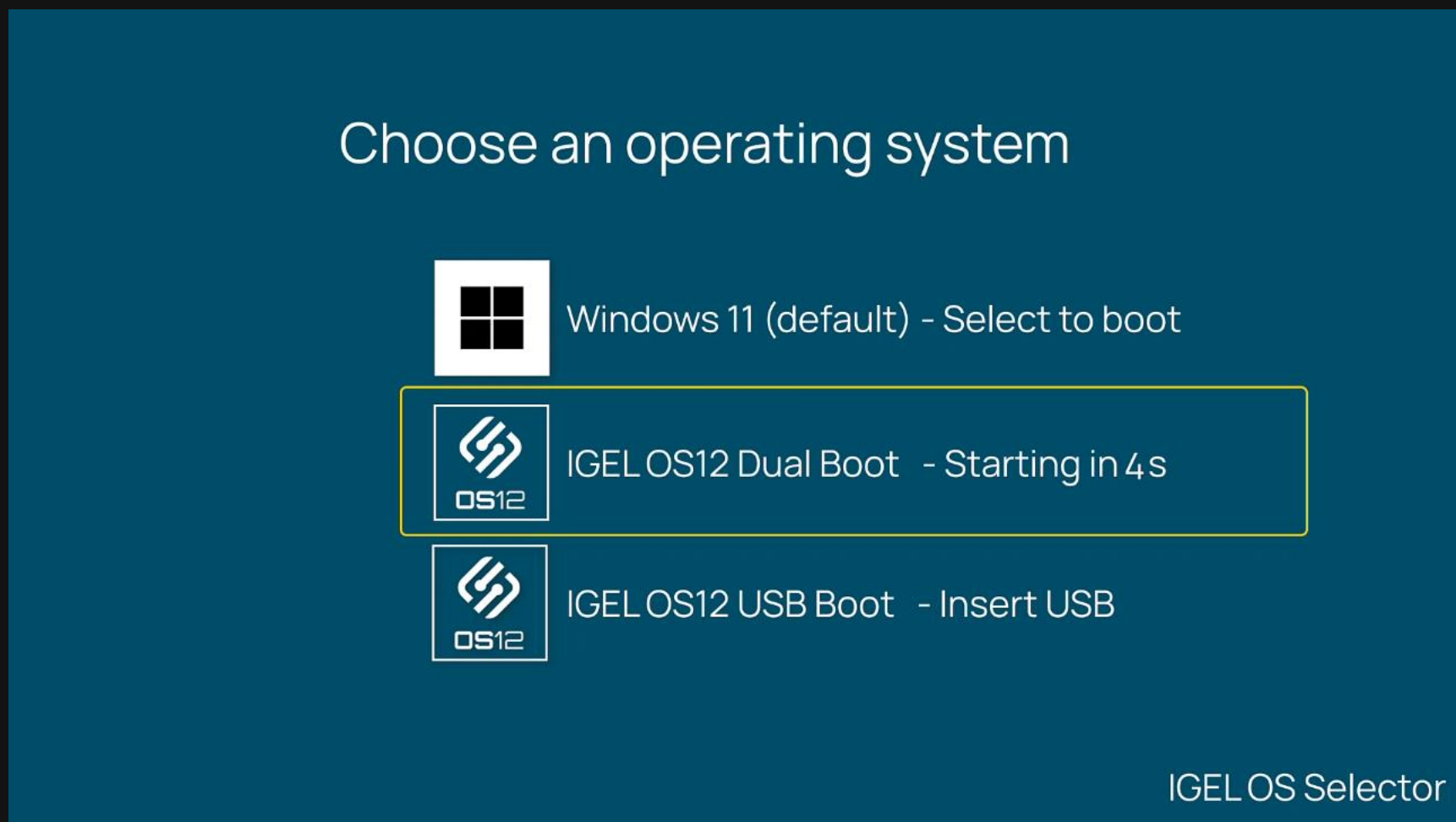


Onboard



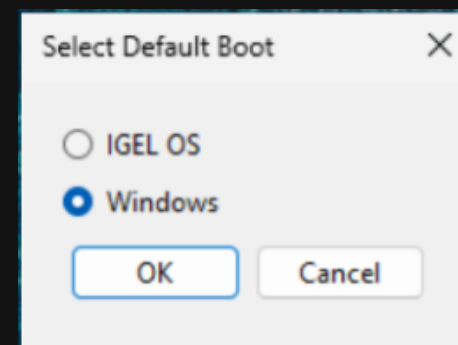
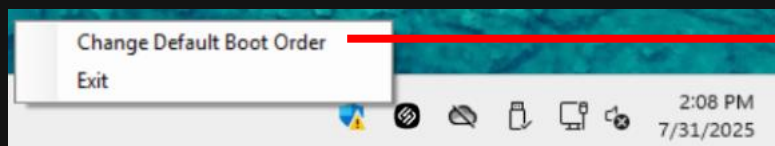
Test

Dual Boot™ Boot Screen



Shows for 5 Seconds Until Key is Pressed

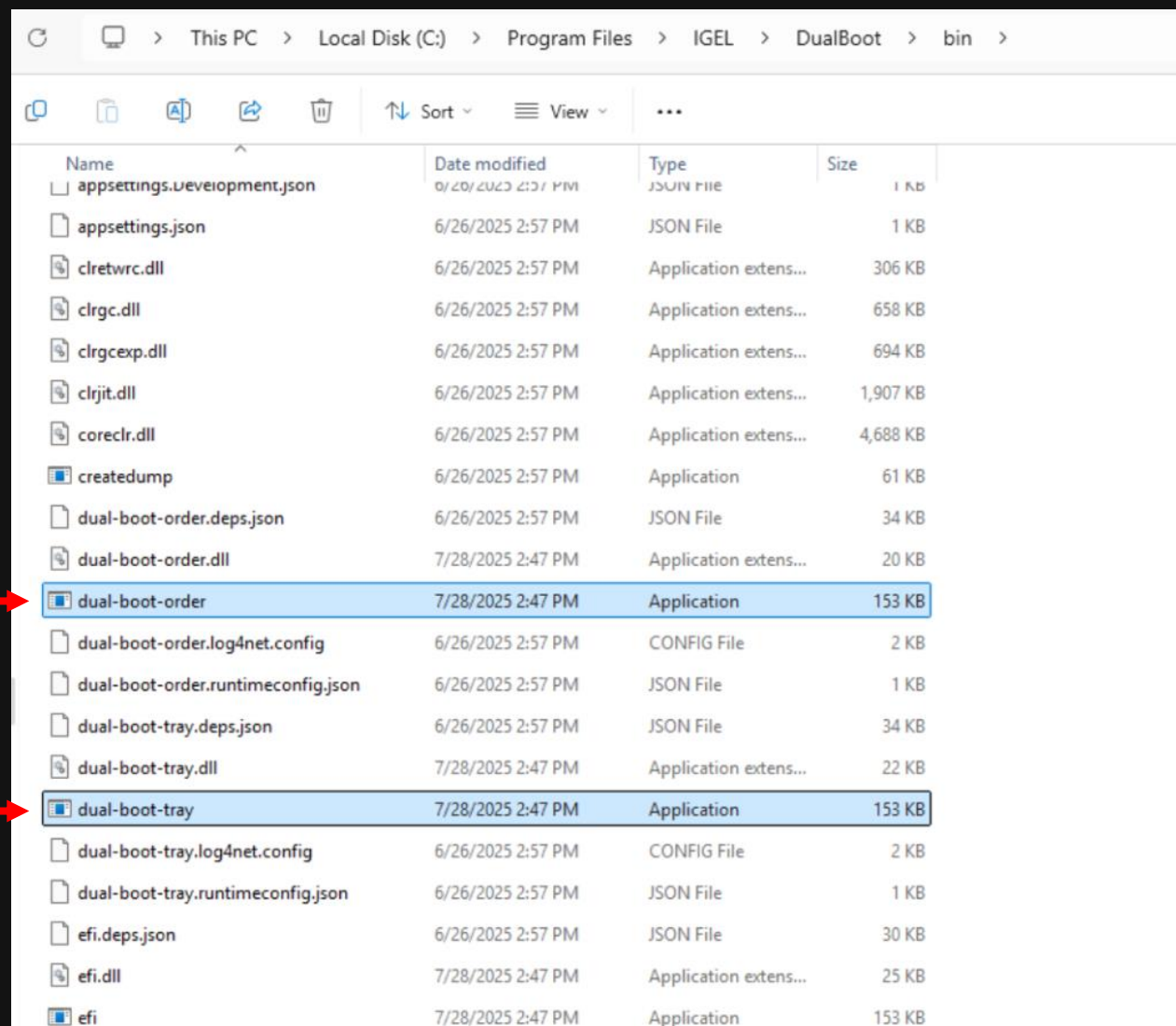
Windows Systray Tool



Windows Binaries

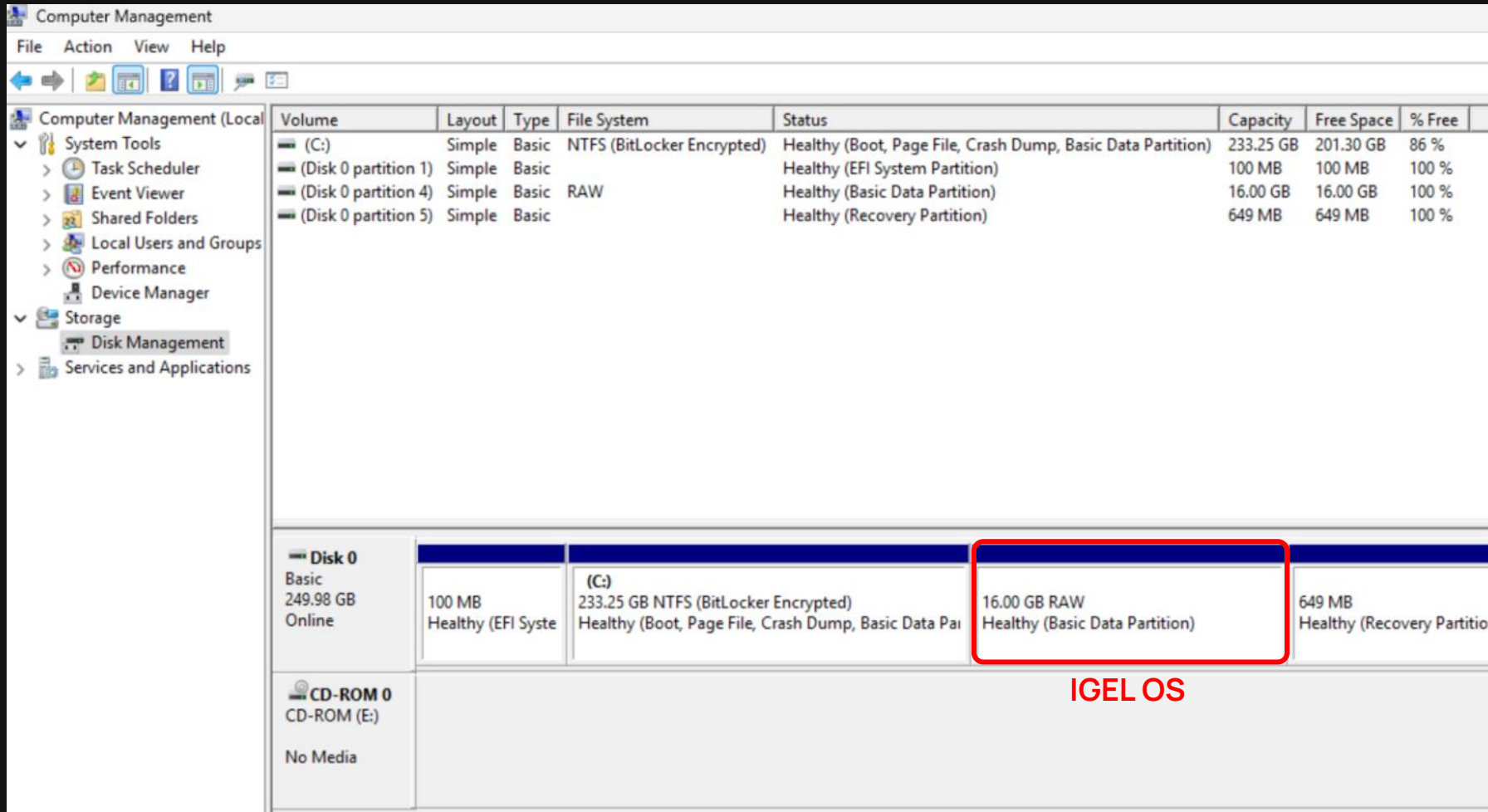
App to Change Boot Order

Systray App



Name	Date modified	Type	Size
appsettings.development.json	6/20/2023 2:31 PM	JSON File	1 KB
appsettings.json	6/26/2025 2:57 PM	JSON File	1 KB
clretwrc.dll	6/26/2025 2:57 PM	Application extens...	306 KB
clrgc.dll	6/26/2025 2:57 PM	Application extens...	658 KB
clrgcexp.dll	6/26/2025 2:57 PM	Application extens...	694 KB
clrjit.dll	6/26/2025 2:57 PM	Application extens...	1,907 KB
coreclr.dll	6/26/2025 2:57 PM	Application extens...	4,688 KB
createdump	6/26/2025 2:57 PM	Application	61 KB
dual-boot-order.deps.json	6/26/2025 2:57 PM	JSON File	34 KB
dual-boot-order.dll	7/28/2025 2:47 PM	Application extens...	20 KB
dual-boot-order	7/28/2025 2:47 PM	Application	153 KB
dual-boot-order.log4net.config	6/26/2025 2:57 PM	CONFIG File	2 KB
dual-boot-order.runtimeconfig.json	6/26/2025 2:57 PM	JSON File	1 KB
dual-boot-tray.deps.json	6/26/2025 2:57 PM	JSON File	34 KB
dual-boot-tray.dll	7/28/2025 2:47 PM	Application extens...	22 KB
dual-boot-tray	7/28/2025 2:47 PM	Application	153 KB
dual-boot-tray.log4net.config	6/26/2025 2:57 PM	CONFIG File	2 KB
dual-boot-tray.runtimeconfig.json	6/26/2025 2:57 PM	JSON File	1 KB
efi.deps.json	6/26/2025 2:57 PM	JSON File	30 KB
efi.dll	7/28/2025 2:47 PM	Application extens...	25 KB
efi	7/28/2025 2:47 PM	Application	153 KB

Disk Space Breakdown (from Windows)



The screenshot shows the Windows 'Computer Management' console, specifically the 'Disk Management' section. The left pane shows the navigation tree with 'Disk Management' selected. The main pane displays a table of disk partitions. Below this table, a detailed view of 'Disk 0' is shown, with a red box highlighting the '16.00 GB RAW' partition, which is labeled 'IGEL OS' in red text.

Volume	Layout	Type	File System	Status	Capacity	Free Space	% Free
(C:)	Simple	Basic	NTFS (BitLocker Encrypted)	Healthy (Boot, Page File, Crash Dump, Basic Data Partition)	233.25 GB	201.30 GB	86 %
(Disk 0 partition 1)	Simple	Basic		Healthy (EFI System Partition)	100 MB	100 MB	100 %
(Disk 0 partition 4)	Simple	Basic	RAW	Healthy (Basic Data Partition)	16.00 GB	16.00 GB	100 %
(Disk 0 partition 5)	Simple	Basic		Healthy (Recovery Partition)	649 MB	649 MB	100 %

Disk 0	100 MB	(C:)	16.00 GB RAW	649 MB
Basic 249.98 GB Online	Healthy (EFI Syste	233.25 GB NTFS (BitLocker Encrypted) Healthy (Boot, Page File, Crash Dump, Basic Data Pai	Healthy (Basic Data Partition)	Healthy (Recovery Partitio

CD-ROM 0
CD-ROM (E:)
No Media

IGEL OS

Disk Space Breakdown (from IGEL OS)

```
Local Terminal
root@ITCBC241145070E:~# fdisk -l
Disk /dev/sda: 250 GiB, 268435456000 bytes, 524288000 sectors
Disk model: QEMU HARDDISK
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: D10E6614-89FB-46CB-AF38-F9B595BDC6F2
```

Device	Start	End	Sectors	Size	Type
/dev/sda1	2048	206847	204800	100M	EFI System
/dev/sda2	206848	239615	32768	16M	Microsoft reserved
/dev/sda3	239616	489400319	489160704	233.3G	Microsoft basic data
/dev/sda4	489400320	522954751	33554432	16G	Microsoft basic data
/dev/sda5	522954752	524283903	1329152	649M	Windows recovery environment

IGEL OS

Deploying a Test Environment

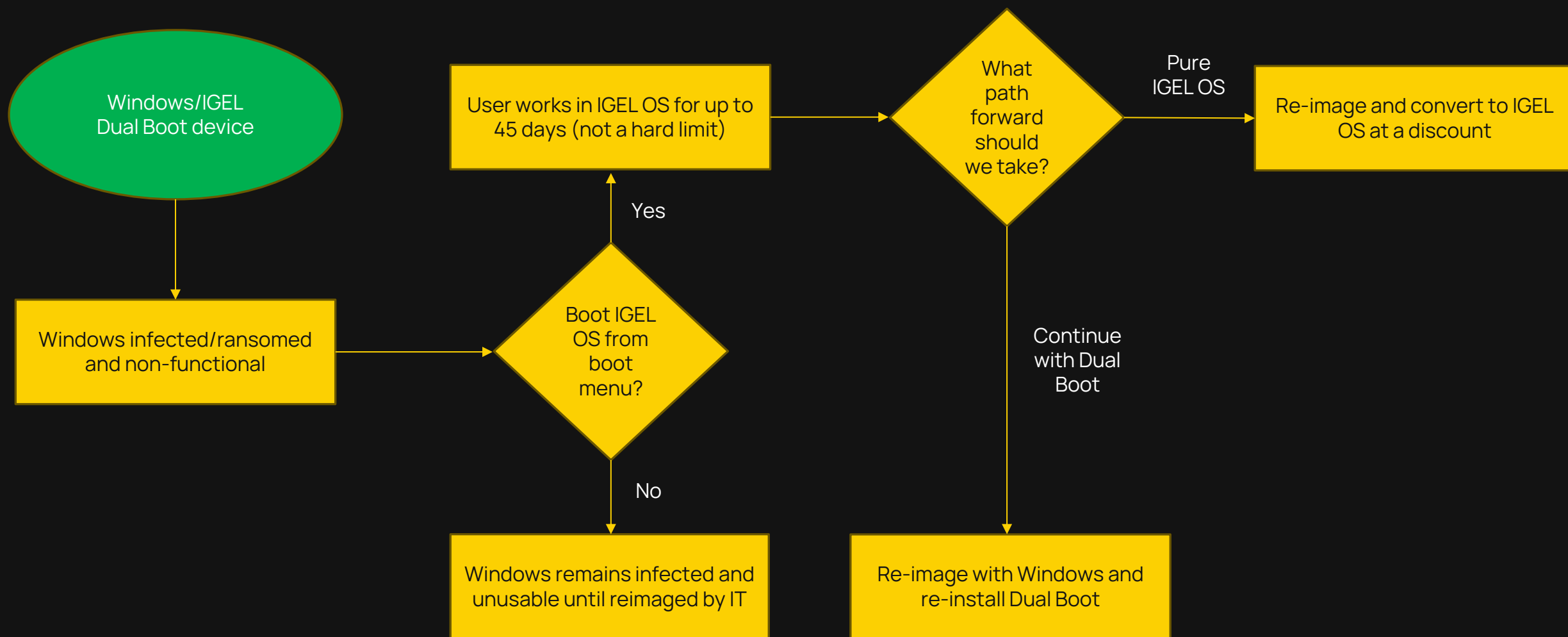
- Physical endpoints are preferred, especially for customer PoCs
 - 8GB+ RAM (ideal)
 - 1.5ghz+ CPU
 - 120GB+ Disk (36GB+ free space)
 - Disable Windows System Restore
- Virtualization can work for your own lab
 - ProxMox, HyperV, QEMU, VirtualBox, etc.
 - Snapshots are handy before and after!



Considerations



What happens when an incident hits?



Points to Note

- Dual Boot is for systems that are initially only running Windows
- If you uninstall Dual Boot, all components including the 16GB partition are removed
- Solution works on Windows 10 as well (if customer has extended support)
- No technical licensing enforcement
- No enforcement of 45 day “emergency period” (will reset again for next time)

Roadmap Items

- Manage IGEL OS updates within Windows
- Dual-boot with multiple physical drives
- Windows Service to verify bootloader

What else would you like to see?



OS12



Troubleshooting



Initial Things to Check

- Physical endpoint meets system requirements?
- Sufficient free space available?
- Minimum software versions met?
- Windows System Restore disabled?
- Full local admin account used for install?
- Hardware diagnostics performed? (via UEFI or 3rd party tools)

“Insufficient disk space” but space available

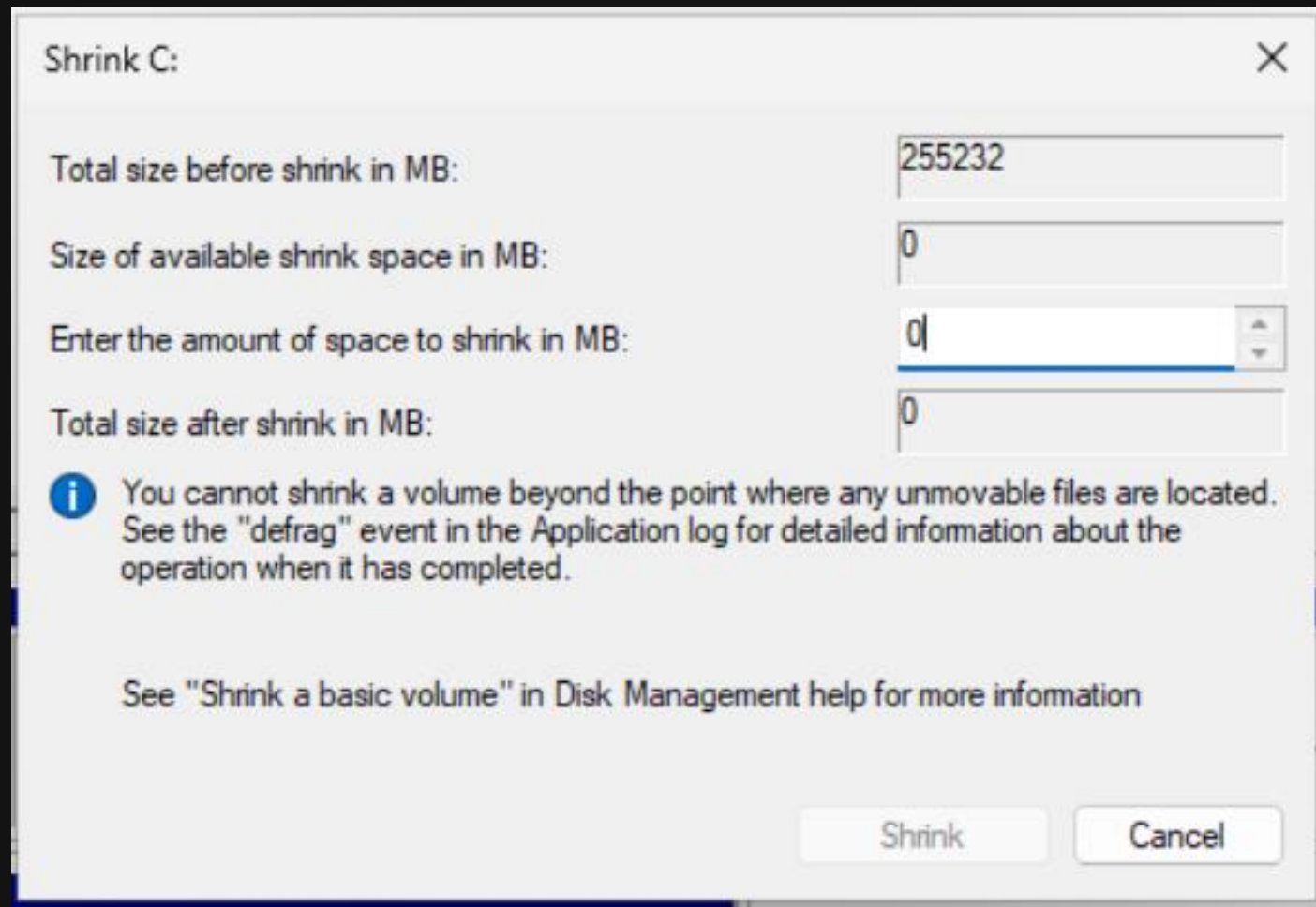
The screenshot shows the Windows Computer Management console with the Disk Management tab selected. The left sidebar lists System Tools, Storage, and Services and Applications. The main area displays a table of disk partitions and their properties.

Volume	Layout	Type	File System	Status	Capacity	Free Space	% Free
(C:)	Simple	Basic	NTFS (BitLocker Encrypted)	Healthy (Boot, Page File, Crash Dump, Basic Data Partition)	249.25 GB	213.77 GB	86 %
(Disk 0 partition 1)	Simple	Basic		Healthy (EFI System Partition)	100 MB	100 MB	100 %
(Disk 0 partition 4)	Simple	Basic		Healthy (Recovery Partition)	649 MB	649 MB	100 %
virtio-win-0.1.271 (E:)	Simple	Basic	CDFS	Healthy (Primary Partition)	693 MB	0 MB	0 %

Below the table, there are two dialog boxes. The first is titled "IGEL OS Dual Boot 1.0.0.rc5" and shows a progress bar with the text "Please wait while Windows configures IGEL OS Dual Boot 1.0.0.rc5" and "Gathering required information...". The second is a "Setup" dialog box with a yellow warning icon and the message: "Insufficient disk space for installation. A minimum of 36 GB of free space is required on the Windows partition. Please ensure there is enough space available and try again."

The bottom section of the Disk Management console shows the details for Disk 0 and CD-ROM 0. Disk 0 is a Basic disk with a capacity of 249.98 GB and is Online. It contains three partitions: a 100 MB Healthy (EFI System Partit), a 249.25 GB NTFS (BitLocker Encrypted) Healthy (Boot, Page File, Crash Dump, Basic Data Partition), and a 649 MB Healthy (Recovery Partition). CD-ROM 0 is a CD-ROM with a capacity of 693 MB and is Online. It contains one partition: a 693 MB CDFS Healthy (Primary Partition).

Try to manually shrink C:\ drive



Shrink C: [X]

Total size before shrink in MB: 255232

Size of available shrink space in MB: 0

Enter the amount of space to shrink in MB: 0

Total size after shrink in MB: 0

i You cannot shrink a volume beyond the point where any unmovable files are located. See the "defrag" event in the Application log for detailed information about the operation when it has completed.

See "Shrink a basic volume" in Disk Management help for more information

Shrink Cancel

← Needs to be 16,384MB+ here (16GB for IGEL partition)

Check Application Log for Event ID 259

Application Number of events: 2,409

Level	Date and Time	Source	Event ID	Task Category
Information	7/29/2025 10:51:24 AM	Security-SPP	16384	None
Information	7/29/2025 10:50:58 AM	Defrag	258	None
Information	7/29/2025 10:50:58 AM	Defrag	259	None
Information	7/29/2025 10:50:56 AM	SecurityCenter	15	None
Information	7/29/2025 10:50:54 AM	SecurityCenter	1	None
Information	7/29/2025 10:50:36 AM	Security-SPP	16394	None
Information	7/29/2025 10:50:36 AM	Security-SPP	900	None

Event 259, Defrag

General Details

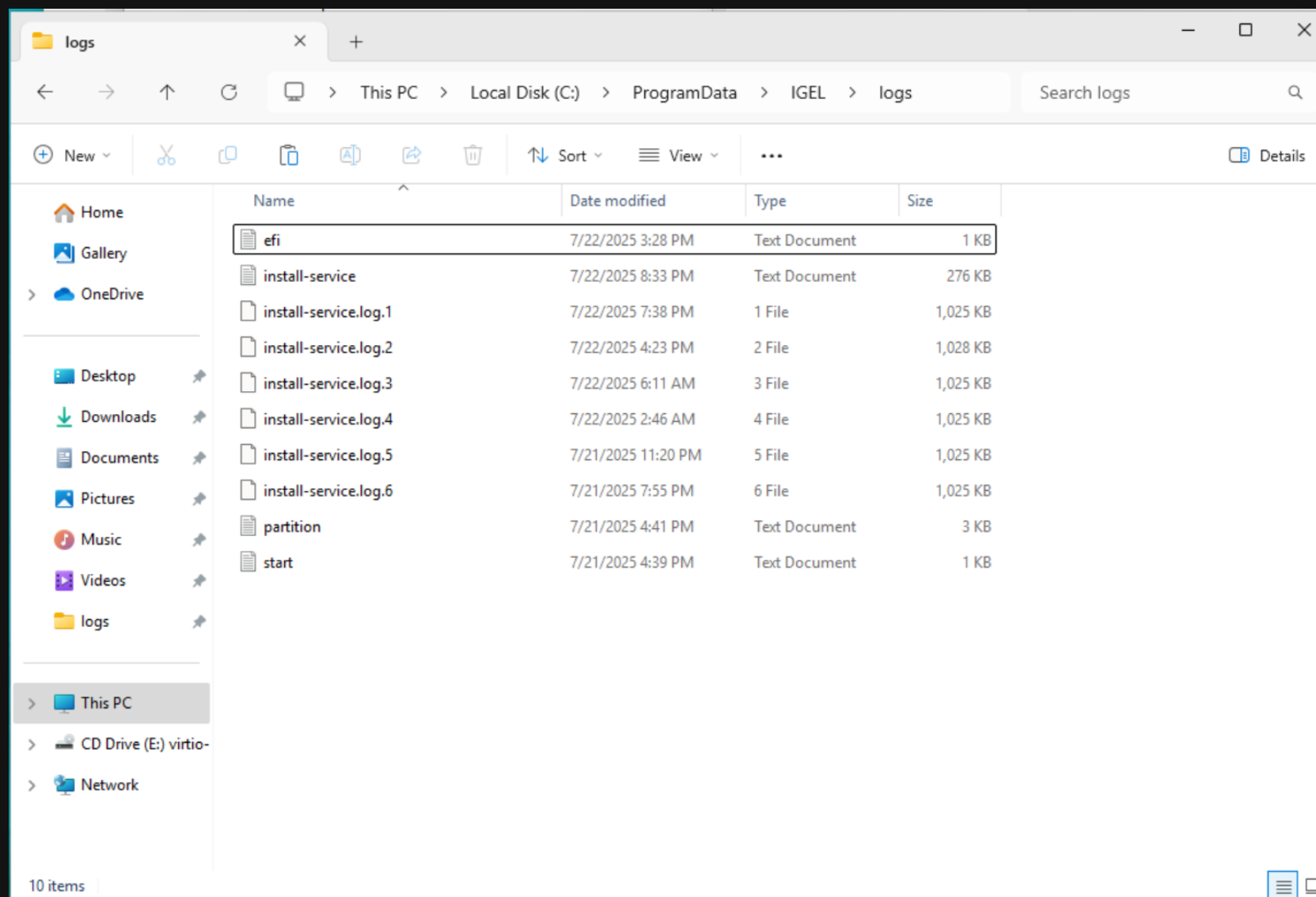
A volume shrink analysis was initiated on volume (C:). This event log entry details information about the last unmovable file that could limit the maximum number of reclaimable bytes.

Diagnostic details:

- The last unmovable file appears to be: \System Volume Information\{ecb2a3ed-635f-11f0-97b3-9b961e2a5649}\3808876b-c176-4e48-b7ae-04046e6cc752>::\$DATA
- The last cluster of the file is: 0x3bc265f
- Shrink potential target (LCN address): 0x86c3fc
- The NTFS file flags are: ---AD
- Shrink phase: <analysis>

To find more details about this file please use the "fsutil volume querycluster [\\?\Volume{78f98aae-07b9-4d68-8850-3b3292c24a28}](#) 0x3bc265f" command.

Logging



C:\ProgramData\IGEL\logs



Resources



Notable Links

- Business Continuity Public Landing Page
 - <https://www.igel.com/business-continuity/>
- Blog
 - <https://www.igel.com/blog/igel-business-continuity/>
- Solution Brief
 - https://www.igel.com/wp-content/uploads/IGEL_Solution_Brief_Business-Continuity.pdf
- Slack Community Channel
 - #igel-os

Simply **IGEL** it